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UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
WASHINGTON
(April 22, 1935)
(Revision of Letter Circular LC195 issued March 12, 1926)

Letter
Circular
LC-440

Information Section
National Bureau of Standards
Washington, D.C.

TESTING LABORATORIES EQUIPPED FOR METALLURGICAL TESTS

Compiled by the Division of Metallurgy of the National Bureau of Standards, from replies to a circular letter which was distributed to engineering schools and laboratories.

The National Bureau of Standards, in accordance with law, makes tests and carries out investigations for other agencies of the Federal Government. Owing to the large amount of this official work, it is impracticable for the Bureau of make metallurgical tests for private individuals if other laboratories can do the work.

This list, alphabetically arranged, has been prepared to inform persons interested regarding the location of other laboratories and the type of work which they state they are prepared to do.

It is expected that additions to or revisions of this circular will be made from time to time as information is received as to other laboratories equipped for metallurgical testing.

Letter Circulars are not available in the Government Printing Office, and the supply at the National Bureau of Standards is limited. They are often transitory in character and are used primarily to answer specific inquiries, thus avoiding the preparation of a large number of letters on the same subject.

ALABAMA

Fertig, George J., Comer Building, Birmingham
Physical testing

Pittsburgh Testing Laboratory, Phoenix Building, Birmingham
(Branch, see Pennsylvania)

ARIZONA

University of Arizona, College of Mines and Engineering, Tucson
(T. G. Chapman)
General metallurgy

CALIFORNIA

California Institute of Technology, Pasadena
(Frederick J. Converse)
Metallographic examinations
Photomicrography

Hunt Company, Robert W., 251 Kearny Street, San Francisco
(Branch, see Illinois)

Los Angeles Testing Laboratory, 1300 South Los Angeles Street, Los Angeles
(H. W. McCall)
Fully equipped for chemical and physical testing

Maas Laboratories, Arthur R., 308 East 8th Street, Los Angeles
Chemical compositions and analyses on ferrous and non-ferrous alloys
Melting points of non-ferrous alloys

Smith-Emery Company, 920 Santee Street, Los Angeles
(Otto Wartenweiler, E. O. Slater)
Chemical analyses
Metallography

Twining Laboratories, The, 2527 Fresno Street, Fresno
(F. E. Twining, B. W. Casebolt, Herman Hempel)
Chemical analysis and research
Metallographic analysis and research
Photomicrography
Physical testing
Spectrographic analysis and research

COLORADO

Colorado School of Mines, Department of Civil Engineering, Golden
(T. A. Kelly, S. A. McCosh)
Electrolytic work
Fatigue
Grinding
Heat treatment
Metallography
Standard compression, tension and flexure tests

CONNECTICUT

Rockwell Co., Stanley P. 296 Homestead Avenue, Hartford
(Stanley P. Rockwell)
Bearing metals
Heat treatment in any commercial size that can be shipped
Melting points
Metallography
Solder
Thermal analysis (by dilatometer)
Wear tests under specific commercial conditions
Welding materials

Souther Engineering Co., The Henry 11 Laurel Street, Hartford
(Jas. A. Newlands, F.P.Gilligan, J.H.G.Williams)
Advice as to preferable compositions and heat treatments for particular designs or type of construction
Chemical analysis of iron and steels, brasses and bronzes, special alloys, industrial chemical compounds
Control methods for iron foundry, brass foundry, forging, heat treating and inspection departments; to insure uniformity of quality, proper physical characteristics, machinability, etc.
Development of special properties in steels or alloys through special treatment
Influence of elevated temperatures on the physical properties of metals
Macroscopic and microscopic studies of metals and reports thereon in plain language that reveals the information sought
Physical characteristics of steels, bronzes and special alloys, including data as to resistance to impact, repeated stresses, etc.
Preparation of specifications for material, treatment, inspection, etc.
Simple but effective methods for increasing output of plating rooms, improving quality of plate, and providing operating force with simple methods of control

CONNECTICUT (continued)

Yale University, Sheffield Scientific School, Hammond Metallurgical Laboratory, 14 Mansfield Street, New Haven
(C. H. Mathewson, A. Phillips)
Laboratory of Engineering Mechanics
(C. J. Tilden)
Bearing metals
Experimental alloys by gas and electric melting
Forging on a small scale
High temperature tensile and flow tests could be arranged for.
Melting points
Rolling and wire drawing
Thermal analysis
X-ray diffraction

DISTRICT OF COLUMBIA

Fuller, Henry C., Columbia Medical Building, 1835 I Street
Miscellaneous analytical work on metals, metallic products and alloys

IDAHO

University of Idaho, College of Engineering, Moscow
(I. C. Crawford)
Core sand testing
Molding sand testing

ILLINOIS

Armour Institute of Technology, Chemical Engineering and Mechanical Engineering Laboratories, Chicago
(H. McCormack, A. H. Carpenter, P. C. Huntly)
Corrosion testing
Experimental forging
Gas in metals analyses could probably be arranged for, but are not now done
Heat treatment of small specimens
Metallography
Preparation of special alloys
Rolling and drawing can probably be arranged for
Sand testing
Solders
Thermal analysis, high temperature tests (-50 to 1800°F) including stress-strain relations, bearing metals, melting points
Wear tests
Welding materials

ILLINOIS (continued)

Block Laboratories, 43 East Ohio Street, Chicago
(D. J. Block, R. M. Block, [illegible] Dresher)
Core binders
Sand testing
Tensile strength

Gordon Co., Claud S., 707-714 West Madison Street, Chicago
(C. S. Gordon)
Temperature testing (gas and electric furnaces), short or long-time tests
X-ray testing (completely equipped for)

Hunt Company, Robert W. 2200 Insurance Exchange, Chicago
(C. [illegible] Plummer, G. B. Girault, R. K. Akin, C. Bowen)
Assaying
Chemical analysis
Foundry service
Industrial research and special investigation of all engineering materials, ferrous and non-ferrous
Metallography
Microscopic analysis
Physical testing
Welder qualification tests
X-ray

Kawin Company, Charles C. 431 So. Dearborn Street, Chicago
(C. C. Kawin, John Tissing)
Bearing metal analysis
Iron and steel analysis
Molding sands (foundry practice a specialty)

Northwestern University, Dental School, 311 East Chicago Avenue, Chicago
Corrosion resistance)
Crushing strength) dental amalgams
Flow)
Setting changes)

Corrosion resistance)
Hardness) dental golds(wrought and casting)
Heat treatment)
Tensile tests)

Pittsburgh Testing Laboratory, 205 W. Wacker Drive, Chicago
(Branch, see Pennsylvania)

Republic Steel Corporation, Chicago
Robert Archer (Branch, see Ohio)

INDIANA

Purdue University, Department of Chemistry, Lafayette
(A. R. Middleton)
Metallography

Rose Polytechnic Institute, Terre Haute
(D. B. Prentice)
Brinell hardness
Chemical analysis of iron, steel, brass and other alloys
Cross bending
Heat treating specimens as desired
Machining standard test specimens
Macroscopic examination
Microphotography and microscopic examination
Tension or compression
Torsion

IOWA

Iowa State College, Engineering Experiment Station, Ames
(T. R. Agg)
Not prepared to do commercial metallurgical work except by special arrangement

Patzig Testing Laboratories, 2215 Ingersoll Avenue, Des Moines
(Monroe L. Patzig)
Analytical analyses and tests for tensile, transverse and compression strengths, elongation, hardness and impact

State University of Iowa, College of Engineering, Iowa City
(C. C. Williams, Edward Bartow, H.O.Croft, A.P.Hoelscher)
Corrosion testing
Heat treatment
Metallography
Physical tests of dental amalgams
Thermal analysis

KENTUCKY

University of Kentucky, Department of Mining and Metallurgical Engineering, Lexington
(C. S. Crouse)
Heat treatment
Metallographic testing
Non-ferrous foundry sands; foundry practice

MAINE

University of Maine, College of Technology, Orono
(W. J. Sweetser, H. D. Watson, C. C. Tyrrell)
Metallography

MARYLAND

Johns Hopkins University, School of Engineering, Baltimore
(A. G. Christie)
Metallography (equipped with Leitz "Metallograph" camera and polishing and etching equipment, supplementing the ordinary universal testing machine equipment)

MASSACHUSETTS

Little, Inc., Arthur D. 30 Charles River Road, Cambridge
(E. P. Stevenson, R. C. Griffin, B. B. Fogler, C. G. Harford, H. C. Parish)
Apparatus not now assembled for gas in metals work, but would take up this work if occasion warranted
Bearing metals
Chemical and spectroscopic analyses
Core binders
Corrosion testing
Heat treatment (small specimens)
Melting points (metals and sand or refractories)
Soldering
Tensile testing
Thermal analysis
Wear
Welding materials
X-ray

Worcester Polytechnic Institute, Worcester
(Carl G. Johnson)
Casting
Chemical analysis
Critical transformation determination of steel
Forging
Heat treating
Macroscopic and microscopic analyses
Physical testing
Welding

MICHIGAN

Detroit Testing Laboratory, The 554 Bagley Avenue, Detroit
(W. P. Putnam, J. D. Stoddard, Mary E. Black)
- Metallography
- Physical testing of materials
- Salt spray corrosion testing and plating solution control

Michigan College of Mining and Metallurgy, Houghton
(C. T. Eddy)
- Chemical analysis
- Metallography
- Physical testing (tensile, compression impact, hardness and other conventional tests)
- Protective coatings (electroplating, copper and cyanide, nickel, chromium, zinc; hot dip and vitreous enamel)
- X-ray (diffraction, radiography)

Michigan State College, East Lansing
(W. E. Reuling, H. E. Publow, F. G. Sefing)
- Chemical analysis: gold and silver; ferrous and non-ferrous
- Compressive strength
- Determination of thermal transformations, having both Leeds, Northrup and Brown instruments
- Forging on power hammer specimens not over 1-3/4" diameter
- Hardness testing
- Heat treatment of steels
- Melting points
- Metallography (Bausch & Lomb and Leitz machines)
- Molding sand tests
- Physical testing
- Special alloys in high frequency furnace up to 12 lbs and any type of ferrous alloy up to 3100°F

Pittsburgh Testing Laboratory, 429 Wayne Street, Detroit
(Branch, see Pennsylvania)

United States Radiator Corporation, Industrial Research Laboratory, Detroit
(J. F. McIntire, Franz Valtier, H. W. Dietert)
- Core binders
- Facings
- Partings and other foundry material
- Sand testing

MICHIGAN (continued)

University of Michigan, Department of Engineering Research, Ann Arbor
(A. E. White)
- Caustic embrittlement
- Chemical analysis
- Corrosion resistance - to oxygen and sulphur
- Foundry sands and core oils
- Gases in metals by vacuum fusion method
- Metal cutting and tool life (planing, milling, turning, boring and drilling)
- Metallography
- Physical properties (tension, compression, bending, torsion impact, hardness, fatigue and creep; all at room or elevated temperatures)
- Radiography (200,000 volt X-ray equipment)
- Spectroscopic analysis (both qualitative and quantitative)
- Testing of surfaces for smoothness using the Profilograph with magnifications up to 5000 times
- Thermal and dilatometric analysis

MINNESOTA

University of Minnesota, School of Mines, Minneapolis
(R. L. Dowdell)
- Bearing metals
- Heat treatment (small specimens)
- High and low temperature tensile tests with stress-strain relations
- Impact tests at high and low temperatures
- Metallography
- Preparation of special alloys (dental alloys a specialty)
- Solders
- Thermal analysis
- Welding materials

MISSOURI

Bruce Williams Laboratories, The 620 Joplin Street, Joplin
(Successors to Waring & Williams)
Industrial and analytical testing of iron, steel, clays, sands, metals, zinc, copper, bearing metals, alloys, etc.

Hunt Company, Robert W. Syndicate Trust Building, St. Louis
(Branch, see Illinois)

MISSOURI (continued)

University of Missouri, School of Mines and Metallurgy, Rolla
(Chas. Y. Clayton, H. R. Hanley)
Metallography, including microscopic analyses
Non-ferrous metallurgy, specializing in hydrometallurgy and electrometallurgy
Physical testing
Thermal analyses

MONTANA

Montana School of Mines, Butte
(C. L. Wilson)
Bearing metals
Metallography
Thermal analysis

NEVADA

Lovelock Assay Office, Box 777, Lovelock
(A. H. Scott)
Bearing metals
Solders

University of Nevada, MacKay School of Mines, Reno
(J. A. Fulton)
Heat treatment
Metallography

NEW JERSEY

Ajax Electrothermic Corporation, Trenton
(Dudley Willcox)
Melting and heating in high frequency induction furnaces

Newark College of Engineering, Newark
(H. H. Metzenheim)
Bending tests
Compression testing
Hardness (Brinell)
Heat treatment (gas and electric furnaces)
Metallography
Polishing and grinding
Shore scleroscopes
Tension testing
(definite limits to commercial testing which may be done)

NEW YORK

College of the City of New York, Materials Testing Laboratory,
Convent Avenue and 139th Street, New York City
(J. S. Peck)
Fatigue tests
Impact tests
Micrographic examinations
Physical tests
(R. Stevenson)
Heat transmittance
Physical-chemical measurements

Columbia University, New York City
(W. Campbell, C. G. Fink, B. Davis, A. H. Beyer,
H. A. Fales, L. Work)
Bearing metals
Corrosion testing
Gases in metals (Ledebur oxygen and Allen nitrogen)
Heat treatment
High temperature testing
Metallography
Preparation of special alloys up to 50 lbs
Solders
Thermal analysis
Welding materials
X-ray work, particularly identification of solid phases, particle size determination, and preferred orientation

Cornell University, Department of Experimental Engineering,
Sibley College of Mechanical Engineering, Ithaca
(H. Diederichs, G. B. Upton, W. M. Sawdon, A. C. Davis)
Heat treating
Materials tests
Metallography
Department of Chemistry, College of Arts and Sciences
(E. M. Chamot, W. D. Bancroft, T. R. Briggs,
F. H. Rhodes, C. W. Mason)
Corrosion
Metallography
Preparation of special alloys (small high frequency furnace available)
Spectroscopic analysis
Department of Geology
(H. Ries)
Core binders
Sand testing

NEW YORK (continued)

Electrical Testing Laboratories, 80th St. and East End Avenue, New York City
(P. S. Millar, F. M. Farmer)
Chemical analyses
Melting temperature determinations
Photomicroscopy
Tensile tests (limited facilities for tests at high temperatures)

Hunt Company, Robert W. 53 Park Place, New York City
(Branch, see Illinois)

Ledoux & Co., 155 Sixth Avenue, New York City
(A. M. Smoot)
Corrosion
Gases in metals (Ledebur oxygen and Allen nitrogen only)
Metallography
Special methods of analysis

Kawin Company, Charles C., 110 Pearl Street, Buffalo
(Branch, see Illinois)

New York Testing Laboratories, 80 Washington Street, New York
(G. Brinton Jack, jr., G. J. Horvitz)
Hardness testing
Heat treatments
Impact testing
Metallography
Micromeasurements
Photomicrography
Radiography
Tensile strengths
Torsion tests
Wear tests
X-ray

New York University, University Heights, New York City
(H. J. Masson)
Usual physical or chemical tests applied to metals

Pitkin, Inc., Lucius Gerrans Building, Buffalo
(A. L. Hall, J. H. Birdsong)
(Branch, see following page)

NEW YORK (continued)

Pitkin, Inc., Lucius 47 Fulton Street, New York City
(T. A. Wright, Sam Tour, E. P. Polushkin)

- A.S.T.M. Salt spray and steam test
- Chemical analysis
- Controlled atmosphere
- Corrosion
- High power metallography and microscopy (planimetric and particle size)
- Magnetic analysis
- Physical tests
- Specialties (jewelry and dental alloys
  - (alloy steels
  - (die casting and permanent mold
  - (secondary metals
  - (malleable and cast iron
- Spectrography
- Wear

Pittsburgh Testing Laboratory, 73 Washington Street, New York
(Branch, see Pennsylvania)

Pratt Institute, School of Science and Technology,
215 Ryerson Street, Brooklyn
(C. B. Jones, Allen Rogers, F. S. Egilsrud, R.E.Nesbitt)

- Core binders
- Corrosion testing (salt spray and electrolysis)
- Heat treatment (small specimens)
- Metallography
- Preparation of special alloys
- Sand testing
- Solders
- Thermal analysis
- Welding materials

Rensselaer Polytechnic Institute, Troy
(M. A. Hunter, A. Jones, T. R. Lawson, R. A. Patterson, F. W. Schwartz)

- Brinell tests
- Charpy tests
- Chemical examination of metallurgical materials
- Compression testing to capacity of 1,200,000 lb machine
- Extensometer and gauges for determination of deformations, elastic properties and deflections
- Metallographic examination
- Physical properties, including linear expansion, electrical and thermal conductivity and magnetic properties
- Preparation of metals and alloys(arc or high frequency vacuum furnaces)

NEW YORK (continued)

Rensselaer Polytechnic Institute (continued)
  Rockwell tests
  Spectroscopic analysis: qualitative and quantitative
  Tensile and torsion tests at high temperatures
  Tensile testing to capacity of 600,000 lb machine
  X-ray analysis: crystal structure and orientation; radiography of thin or light metal castings

Republic Steel Corporation, Buffalo
    (H. Burket)
    (Branch, see Ohio)

Stillman & Van Siclen, 254 West 31st Street, New York City
    (I. Hochstadter, R. C. Brumfield (Cooper Union))
  Bearing metals
  Metallography
  Solders
  Welding materials

St. John X-Ray Service, Inc., 30-20 Thomson Avenue, Long Island City
    (Ancel St. John, Herbert R. Isenburger)
  Radiography (can penetrate up to 12 inches of steel)
  X-ray analysis

Touceda Laboratories, 943 Broadway, Albany
    (E. Touceda, E. G. Touceda, David Fales)
  Core binders
  Heat treatment
  Metallography
  Metallurgical analysis of all kinds
  Sand testing

NORTH DAKOTA

University of North Dakota, University Station, Grand Forks
    (L. C. Harrington)
  Bearing metals
  Corrosion (within limits)
  Melting points of metals and refractories
  Metallography
  Wear tests

OHIO

Cosma Laboratories Co., The 1545 E. 18th Street, Cleveland
(F. K. Bezzenberger)
Analysis of iron and steel, brass and bronze
Microscopy (including microphotography, measurements, analyses)
Thermal conductivity (by the plate method)

Crowell & Murray, Inc., 2830 Washington Avenue, Cleveland
(C. B. Murray)
Melting points
Sand testing

Herron Co., James H. 1360-4 West 3d Street, Cleveland
(J. H. Herron, L. F. Herron)
Bearing metals
Chemical analysis (all inorganic materials)
(E. T. Holmberg, J. H. Spohn, J. T. Wilson)
Corrosion testing
Gases in metals (Ledebur oxygen and Allen nitrogen only)
Heat treatment (small specimens)
Melting points
Metallography
Physical testing (tension, compression, transverse, Brinell, scleroscope)
Sand testing and core binders
Solders
Thermal analysis
Welding materials

Kawin Company, Charles C., 222 West 4th Street, Cincinnati
(Branch, see Illinois)

Marshall Co., L. H. 2525 North High Street, Columbus
(L. H. Marshall)
Foundry problems a specialty (clays, corebinders and sands)
Pyrometer service and calibration

Ohio Brass Co., Laboratory Department, Mansfield
(F. L. Wolf, L. B. Thomas)
Bearing metals
Comparative wear tests
Corrosion by salt spray
Heat treatment (small specimens)
High temperature testing (impact -50° to 600°C, tension and compression -50° to 800°C; stress-strain relation not determined)

Ohio Brass Co. (continued)
Metallography
Preparation of special alloys (35 K.V.A. high frequency furnace available)
Solders
Thermal analysis
Welding materials

Ohio State University, Metallurgical Department, Columbus
(D. J. Demorest)
Bearing metals
Chemical analysis of metals, alloys, clays
Corrosion testing
Gases in metals (including modified vacuum fusion methods)
Heat treatment (small specimens)
Metallography
Melting points (metals and refractories)
Preparation of special alloys (35 K.V.A. high frequency furnace available)
Sand testing
Thermal analysis
X-ray work

Queen City Steel Treating Co., 432 Oliver Street, Cincinnati
(N. M. Salkover)
Commercial heat treating only

Republic Steel Corporation, Youngstown
(E. C. Smith, L. B. Grindlay)
Spectroscopic equipment Hilger E1
Vacuum fusion gas equipment with inclusion determination train

----- Warren
(J. J. Bowden)
(Branch, see above)
----- Cleveland
(R. Drews)
(Branch, see above)
----- Canton
(M. J. R. Morris)
(Branch, see above)
----- Massillon
(E. C. Smith)
(Branch, see above)

OREGON

Laucks Laboratories, Inc., Portland
(Branch, see Washington)

Oregon State Agricultural College, School of Engineering, Corvallis
(S. H. Graf)
- Bearing metals
- Corrosion testing
- Experimental heat treatment (small specimens)
- Forging (power hammer)
- Melting points
- Metallography
- Structural
- Thermal analysis
- Wear tests (Norris slip abrasion test)
- X-ray for radiography of welds and light castings

PENNSYLVANIA

Bishop & Co., J. Platinum Works, Malvern
(G. M. Hickey, J. W. Cox, Raymond Steele)
- Analyses of platinum metals, gold and silver and various precious metals
- Make special alloys of precious metals

Carnegie Institute of Technology, College of Engineering, Schenley Park, Pittsburgh
(Webster N. Jones)
- Bearing metals
- Corrosion testing
- High temperature tensile tests to 1500°F without stress-strain relations
- Metallography
- Sand tests

Coleman & Co., W. B. 1920 W. Indiana Avenue, Philadelphia
(W. B. Coleman, C. K. Mitchell)
- Advice on the melting of cast iron and steel, foundry practice, heat treatment of steel and problems concerning the use of metals
- Chemical analysis of metals, alloys
- Complete sand testing
- Melting points
- Metallography

PENNSYLVANIA (continued)

Drexel Institute, 32d & Chestnut Streets, Philadelphia
(L. D. Stratton, J. H. Billings)
- Bearing metals
- Heat treatment, small specimens
- Microscopy
- Photo-elastic investigations
- Solders
- Wear tests
- Welding materials

Erie Laboratory, 1519 French Street, Erie
(J. A. Evans)
- Bearing metals
- Brass and bronze
- Physical tests of materials
- Sand tests, core binders
- Solders
- Steel and iron
- Welding materials

Hunt Company, Robert W. Professional Building, Pittsburgh
(Branch, see Illinois)

Knerr, Horace C., 1116 W. Montgomery Avenue, Philadelphia
(Consulting Metallurgical Engineer)
- Chemical analysis
- Heat treatment
- Metallography
- Physical tests

Metallurgical Advisory Service, 214 Dewey Street, Edgewood-Pittsburgh
(Max Hartenheim)
- Corrosion testing
- Forging
- Foundry
- Furnace investigations
- Heat treatment
- Metallic protective coatings
- Metallography
- Physical testing
- Thermal analysis
- Welding processes

PENNSYLVANIA (continued)

Pittsburgh Testing Laboratory, Stevenson and Locust Streets, Pittsburgh
(C.E.Betz, H.H.Craver, J.W.Reifsnyder, R.B.Lincoln)
Bearing metals
Certification of welders
Chemical analysis
Coefficient of expansion
Corrosion testing (salt spray, weather-ometer, outdoor)
Gases in metals (Ledebur oxygen and Allen nitrogem only)
Heat treatment (small specimens)
Magnetic inspection (Magnaflux)
Metallography and metallurgical investigations
Molding sand tests
Stress-strain relations (Ewing extensometer)
Tensile, compression, shear, torsion and impact tests
Tensile tests at elevated temperatures, to 1600°F
Thermal analysis
Wear tests
Welding construction supervision, investigations and materials

Swarthmore College, Swarthmore
(C. G. Thatcher)
Bearing metals
Heat treatment (small specimens)
Physical tests of metals
Thermal analysis

Tinius Olsen Testing Machine Co., 500 N. 12th St., Phila.
(T. Y. Olsen)
Bearing metals
Endurance tests
Hardness tests
Physical testing
Tensile tests
Wear tests (Norris slip abrasion machine)

RHODE ISLAND

Rhode Island State College, School of Engineering, Kingston
(R. L. Wales)
Compression, shear and tension tests up to a capacity of 300,000 lbs

Saunders, Walter M., 184 Whittier Avenue, Providence
Chemical and metallurgical analyses
Foundry materials
Metallography
Molding sands

TENNESSEE

University of Tennessee, Materials Testing Laboratory, Knoxville
(Chas. E. Ferris)
Beam testing, up to 10,000 lb capacity
Impact testing, up to 120 ft lb Izod type
Strain measuring instruments for tensile tests of metals
Torsion testing up to 60,000 in lb
Universal testing machine, 5,000 up to 200,000 lb capacity

Vanderbilt University, Department of Chemistry, Nashville
(J. M. Breckenridge, W. P. Fishel)
Metallography

TEXAS

College of Mines & Metallurgy, (branch of University of Texas), El Paso
(John F. Graham)
Hydrometallurgy
Metallographic polishing

Fort Worth Laboratories, The, P. O. Box 1379, Fort Worth
(R. H. Fash)
Analysis of metals and alloys
Solder
Tensile strength tests on steels

Pittsburgh Testing Laboratory, Santa Fe Building, Dallas
(Branch, see Pennsylvania)

Rice Institute, Department of Engineering, Houston
(J. H. Pound)
Heat treatment (small specimens)
Metallography
Thermal analysis

UTAH

University of Utah, School of Mines and Engineering, Salt Lake City
(R. B. Ketchum)
Materials testing
Microscopy
Pyrometallurgical testing, including rotary kilns, Cottrell precipitator and Bag House

VIRGINIA

University of Virginia, Department of Engineering, University
(Arthur F. Macconochie)
Expect to have a well-equipped metallurgical laboratory in the fall of 1935.

WASHINGTON

Laucks Laboratories, Inc., 911 Western Avenue, Seattle
(I.F.Laucks, H.P.Banks, H.F.Rippey, J.M.Kniseley)
Bearing metals
Corrosion testing
Melting points
Metallography
Sand tests
Tensile compression tests
Wear tests

Laucks Laboratories, Inc., Tacoma
(Branch, see above)

Laucks Laboratories, Inc., Spokane
(Branch, see above)

Northwest Testing Laboratories, Hartford Building, Second Avenue and James Street, Seattle
(J. G. Priestley)
Bearing metals
Corrosion, including electrolytic
Heat treatment (small specimens)
Melting points
Metallography
Sand tests
Soldering and welding
Thermal analysis
Wear tests

University of Washington, College of Engineering, Seattle
(R. G. Tyler, Milnor Roberts, B. T. McMinn, G. S. Schaller, C. R. Corey)
Core sands and core binders
Heat treatment (small specimens)
Metallography
Thermal analysis

WEST VIRGINIA

West Virginia College of Engineering, Morgantown
(R. P. Davis, W. W. Hodge)
Drop forging
Experimental cupola
Heat treatment (small specimens)
Metallography
Preparation of special alloys to 50 lbs gas furnace
Sand testing, core binders
Solders and welding materials

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CANADA

Canadian Inspection & Testing Co. Ltd., 52 York Street, Toronto, Ontario
(R. W. Hurlburt, B.A.Sc., J. E. Clark, B. A. Sc.)
Bearing metals
Metallography to 500 diameters
Solder
Welding materials

Hunt, Donald, Limited, 1181 Guy Street, Montreal
(Branch of Robert W. Hunt Company; see Illinois)

Appendix (Material received by April 30, 1935)

CALIFORNIA

University of California, College of Engineering, Berkeley
(C. Derleth, jr.)
- Heat treatment
- Physical testing

OKLAHOMA

University of Oklahoma, College of Engineering, Department of Mechanics, Norman
(R. V. James)
- Brinell hardness machine (Olsen)
- Compression and tension tests (Universal Testing Machines 50,000, 100,000 and 200,000 lb capacities, with shear and bending attachments)
- Herbert pendulum
- Photomicrography (E. Leitz equipment)
- Stress-strain data
- Tension (details given under compression)
- Torsion machine (10,000 in. lb capacity)